



SUBSTITUTE  
SEQUENCE LISTING

<100> Rafalski, J. Antoni  
Cahoon, Rebecca E.  
Coughlan, Sean  
Miao, Guo-Hua

<120> PLANT VITAMIN E BIOSYNTHETIC ENZYMES

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<151> 1998-12-03

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tctggtgtgg tccatggaga gtggcgagca catgccggac aagagaaagt ttgttagtga 180

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cgccgtgata aaatcagcgc taacatggaa gggcttcacc tctctgctga cgaccggatg 480
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Pro Phe Pro Asp Gly Gln Phe Asp Leu Val Trp Ser Met Glu Ser Gly
      35              40              45

Glu His Met Pro Asp Lys Arg Lys Phe Val Ser Glu Leu Ala Arg Val
      50              55              60

Ala Ala Pro Gly Gly Thr Ile Ile Ile Val Thr Trp Cys His Arg Asn
      65              70              75              80

Leu Asp Pro Ser Glu Thr Ser Leu Lys Pro Asp Glu Leu Ser Leu Leu
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Arg Arg Ile Cys Asp Ala Tyr Tyr Leu Pro Asp Trp Cys Ser Pro Ser
      100             105             110

Asp Tyr Val Asn Ile Ala Lys Ser Leu Ser Leu Glu Asp Ile Lys Thr
      115             120             125

Ala Asp Trp Ser Glu Asn Val Ala Pro Phe Trp Pro Ala Val Ile Lys
      130             135             140

Ser Ala Leu Thr Trp Lys Gly Phe Thr Ser Leu Leu Thr Thr Gly Trp
      145             150             155             160

Lys Thr Ile Arg Gly Ala Met Val Met Pro Leu Met Ile Gln Gly Tyr
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 Pro Ser Glu Glu Ser Leu Lys Pro Asp Glu Leu Asn Leu Leu Lys Arg  
 35 40 45  
 Ile Cys Asp Ala Tyr Tyr Leu Pro Asp Trp Cys Ser Pro Ser Asp Tyr  
 50 55 60  
 Val Lys Ile Ala Glu Ser Leu Ser Leu Glu Asp Ile Arg Thr Ala Asp  
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 gcctcgggtt cccctcgcgc cggcctctgc ctccaccacc accgccgccg ccgccgcagc 180  
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 gcggcggcag ctcccccggg gctgaaggag ggcattcgcg ggctctacga cgaancgtcc 300  
 ggcgtgtggg agagcatctg gggcgagcac atgcaccacg gnttctacga cgccggcgag 360  
 ggcgcctcca tgtccgacca ccgccgcgcc ccagttcgca tgatcgagga cctcgccttc 420  
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 Arg Cys Thr Ser Arg His Leu Cys Ala Ser Ala Ser Pro Arg Ala Gly  
 35 40 45  
 Leu Cys Leu His His His Arg Arg Arg Arg Ser Ser Arg Arg Thr  
 50 55 60

Lys Leu Ala Val Arg Ala Met Ala Pro Thr Leu Ser Ser Ser Ser Thr  
 65 70 75 80  
 Ala Ala Ala Ala Pro Pro Gly Leu Lys Glu Gly Ile Ala Gly Leu Tyr  
 85 90 95  
 Asp Glu Xaa Ser Gly Val Trp Glu Ser Ile Trp Gly Glu His Met His  
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 His Gly Phe Tyr Asp Ala Gly Glu Gly Ala Ser Met Ser Asp His Arg  
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 aggatgacaa gaagaagctg cagaaggaa tcgcagagtt ttacgacgag tcgtctggct 240  
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 taggtggcag ctctagatac ctggccaaga aatttggagc aaccagtgtg ggcatactc 480  
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 cttatgtcac tgatcattat ttccacacta gataaccctt tacaactaag aacgtagtct 1080  
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 tacaagaaaa tatcttttat atatataaat gattcaatca aattacttga tgaggattat 1200  
 gagtgaatat gagaggacag tcatagaaac tttatcctac attccttcta tttccacttc 1260  
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 Pro Arg Ser Trp Ala Pro Ile Arg Ala Ser Ala Ala Ser Ser Glu Arg  
 35 40 45

Gly Glu Ile Val Leu Glu Gln Lys Pro Lys Lys Asp Asp Lys Lys Lys  
 50 55 60  
 Leu Gln Lys Gly Ile Ala Glu Phe Tyr Asp Glu Ser Ser Gly Leu Trp  
 65 70 75 80  
 Glu Asn Ile Trp Gly Asp His Met His His Gly Phe Tyr Asp Ser Asp  
 85 90 95  
 Ser Thr Val Ser Leu Ser Asp His Arg Ala Ala Gln Ile Arg Met Ile  
 100 105 110  
 Gln Glu Ser Leu Arg Phe Ala Ser Val Ser Glu Glu Arg Ser Lys Trp  
 115 120 125  
 Pro Lys Ser Ile Val Asp Val Gly Cys Gly Ile Gly Gly Ser Ser Arg  
 130 135 140  
 Tyr Leu Ala Lys Lys Phe Gly Ala Thr Ser Val Gly Ile Thr Leu Ser  
 145 150 155 160  
 Pro Val Gln Ala Gln Arg Ala Asn Ala Leu Ala Ala Ala Gln Gly Leu  
 165 170 175  
 Ala Asp Lys Val Ser Phe Gln Val Ala Asp Ala Leu Gln Gln Pro Phe  
 180 185 190  
 Ser Asp Gly Gln Phe Asp Leu Val Trp Ser Met Glu Ser Gly Glu His  
 195 200 205  
 Met Pro Asp Lys Ala Lys Phe Val Gly Glu Leu Ala Arg Val Ala Ala  
 210 215 220  
 Pro Gly Ala Ile Ile Ile Ile Val Thr Trp Cys His Arg Asp Leu Gly  
 225 230 235 240  
 Pro Asp Glu Gln Ser Leu His Pro Trp Glu Gln Asp Leu Leu Lys Lys  
 245 250 255  
 Ile Cys Asp Ala Tyr Tyr Leu Pro Ala Trp Cys Ser Thr Ser Asp Tyr  
 260 265 270  
 Val Lys Leu Leu Gln Ser Leu Ser Leu Gln Asp Ile Lys Ser Glu Asp  
 275 280 285  
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35 40 45  
Asp Asp Pro Thr Asn Lys Pro Lys Thr Ile Val Asp Val Gly Cys Gly  
50 55 60



Ile	Gly	Gly	Ser	Ser	Arg	Tyr	Leu	Gly	Glu	Gln	Ile	Trp	Ser	Thr	Met	
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			85						90					95		
Ala	Ala	Ala	Gln	Gly	Val	Val	Arg	Thr	Arg	Phe	Phe	Pro	Ile	Ala	Asp	
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Leu	Asn	Leu	Leu	Lys	Lys	Ile	Cys	Asp	Ala	Tyr	Tyr	Leu	Pro	Asp	Trp	
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 Phe Leu Phe Thr Ala Pro Tyr Gly Gly Asp His Gly Val Gly Ala Asp  
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 cgtgctgctg ccgctcaacg agccgggtgca cggcaccaag cggcggagcc agatacagac 240  
 gtacctggac caccacggcg gcccgggggt gcagcacatc gcgctggcca gcgacgacgt 300  
 gtcggggacg ctganggaga tgccnnggcgc ctccgcatgg gcggttcgat tcttggggcc 360  
 gccgccgcca actactacga cggctgcgcg gcgcnccggg acttctctcg ggagagcaat 420  
 taacaatgcc aagactcngg tgtcctggac aaggatacaa gggtttccaa tnttaacaag 480  
 cattgaanag nnactttctg gngagatcaa gatggtgatg aaagtnaatg gaagntncaa 540  
 aggggntcgc ggttggaaga atntcggctt aatcataggg tngaaacctn agcacagcct 600  
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 <213> Oryza sativa

<220>  
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<400> 14  
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 20 25 30  
 Ala Glu Phe Thr Ala Glu Asp Val Gly Thr Ala Glu Ser Gly Leu Asn  
 35 40 45

Ser Val Val Leu Ala Asn Asn Ala Glu Thr Val Leu Leu Pro Leu Asn  
 50 55 60  
 Glu Pro Val His Gly Thr Lys Arg Arg Ser Gln Ile Gln Thr Tyr Leu  
 65 70 75 80  
 Asp His His Gly Gly Pro Gly Val Gln His Ile Ala Leu Ala Ser Asp  
 85 90 95  
 Asp Val Leu Gly Thr Leu Xaa Glu Met Pro Gly Ala Ser Ala Trp Ala  
 100 105 110  
 Val Arg Phe Leu Gly Pro Pro Pro Pro Thr Thr  
 115 120

<210> 15  
 <211> 1027  
 <212> DNA  
 <213> Glycine max

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 taagtcggac cgctttcaag tcaaccgctt ccaccacatc gagttctggg gcaccgatgc 180  
 caccaacgcc tctcgccgat tctcttgggg acttggaatg cctattgtgg caaaatctga 240  
 tctctccacc ggaaaccaa tccacgcctc ctacctctc cgctccggcg acctctcctt 300  
 cctcttctcc gctccttact ctccctctct ctccgcccgc tctccgctg cctcctccgc 360  
 ctccattccc agtttcgacg ccgccacctg ccttgccctc gctgccaaac acggcttcgg 420  
 cgtccgcgcc atcgcccttg aagtcgccga cgcggaagcc gctttcagcg ccagcgtcgc 480  
 gaaaggagcg gagccggcgt cgcgcgcggg tctcgtcgac gatcgaccg gcttcgcgga 540  
 ggtgcgccct tacggcgacg tgggtgctccg ctacgtcagc tacaaggacg ccgcgcgcga 600  
 ggcgccacac gcagatncgt cgcggtgggt cctgcgggga ttcgaggccg cggcgctcgtc 660  
 gtcttcggtt ccggagctgg actacgggat ccggcggtg gaccacgccg tcgggaacgt 720  
 tccggagctg gcgcggcgcg tgaggtacct gaaaggcttc agcggattcc acgagttcgc 780  
 ggagttcacc gcggaggacg tgggaacgag cgagagcggg ttgaactcng tggttctggc 840  
 ngaacaactc ggagacggtg ttgctgccgc tgaacnagcc cggtttacgg aacgaaagag 900  
 gaagaagcca nattgagnnc gtatttngaa cacaancnaa aggtgcttgg tgtgcagcaa 960  
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 acgtttg 1027

<210> 16  
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 <213> Glycine max

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 Ala Gln Ala Gln Pro Gly Phe Lys Leu Val Gly Phe Lys Asn Phe Val  
 20 25 30  
 Arg Thr Asn Pro Lys Ser Asp Arg Phe Gln Val Asn Arg Phe His His  
 35 40 45  
 Ile Glu Phe Trp Cys Thr Asp Ala Thr Asn Ala Ser Arg Arg Phe Ser  
 50 55 60  
 Trp Gly Leu Gly Met Pro Ile Val Ala Lys Ser Asp Leu Ser Thr Gly  
 65 70 75 80  
 Asn Gln Ile His Ala Ser Tyr Leu Leu Arg Ser Gly Asp Leu Ser Phe  
 85 90 95  
 Leu Phe Ser Ala Pro Tyr Ser Pro Ser Leu Ser Ala Gly Ser Ser Ala  
 100 105 110  
 Ala Ser Ser Ala Ser Ile Pro Ser Phe Asp Ala Ala Thr Cys Leu Ala  
 115 120 125  
 Phe Ala Ala Lys His Gly Phe Gly Val Arg Ala Ile Ala Leu Glu Val  
 130 135 140  
 Ala Asp Ala Glu Ala Ala Phe Ser Ala Ser Val Ala Lys Gly Ala Glu  
 145 150 155 160  
 Pro Ala Ser Pro Pro Val Leu Val Asp Asp Arg Thr Gly Phe Ala Glu  
 165 170 175  
 Val Arg Leu Tyr Gly Asp Val Val Leu Arg Tyr Val Ser Tyr Lys Asp  
 180 185 190  
 Ala Ala Pro Gln Ala Pro His Ala Asp Xaa Ser Arg Trp Phe Leu Pro  
 195 200 205  
 Gly Phe Glu Ala Ala Ala Ser Ser Ser Ser Phe Pro Glu Leu Asp Tyr  
 210 215 220  
 Gly Ile Arg Arg Leu Asp His Ala Val Gly Asn Val Pro Glu Leu Ala  
 225 230 235 240  
 Pro Ala Val Arg Tyr Leu Lys Gly Phe Ser Gly Phe His Glu Phe Ala  
 245 250 255

Glu Phe Thr Ala Glu Asp Val Gly Thr Ser Glu Ser Gly Leu Asn Ser  
 260 265 270

Val Val Leu Ala  
 275

<210> 17  
 <211> 511  
 <212> DNA  
 <213> Vernonia mesipifolia

<220>  
 <221> unsure  
 <222> (494)  
 <223> n= a, c, g, or t

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 cgctgctcct gtaacccttg gaaacaacga cgctcgattg tctgaagtta agcttttacgg 180  
 cgatgtcgct ttccggtaca taagttacaa aaatccgaac tatacatctt cctttttgcc 240  
 cgggttcgag cccgttgaaa agacgtcgtc gttttatgac cttgactacg gtatccgccg 300  
 tttggaccac gccgtaggaa cgccctcgag cttgcttcgg cagtggacta cgtgaaatca 360  
 ttcaccggat tccatgagtt cgccgaattc accgcggagg acgtcgggac gagcgagagg 420  
 gaactgaatt cggtcgtttt agcttgcaac agtgagatgg tcttgattcc gatgaacgag 480  
 ccggtgtacg gaanaaaagg aagagccaga t 511

<210> 18  
 <211> 170  
 <212> PRT  
 <213> Vernonia mesipifolia

<220>  
 <221> UNSURE  
 <222> (165)  
 <223> Xaa = ANY AMINO ACID

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 20 25 30  
 Val Ser His Gly Ala Lys Pro Ser Ala Ala Pro Val Thr Leu Gly Asn  
 35 40 45  
 Asn Asp Val Val Leu Ser Glu Val Lys Leu Tyr Gly Asp Val Ala Phe  
 50 55 60  
 Arg Tyr Ile Ser Tyr Lys Asn Pro Asn Tyr Thr Ser Ser Phe Leu Pro  
 65 70 75 80  
 Gly Phe Glu Pro Val Glu Lys Thr Ser Ser Phe Tyr Asp Leu Asp Tyr  
 85 90 95  
 Gly Ile Arg Arg Leu Asp His Ala Val Gly Asn Val Pro Glu Leu Ala  
 100 105 110



Ser Ala Val Asp Tyr Val Lys Ser Phe Thr Gly Phe His Glu Phe Ala  
 115 120 125

Glu Phe Thr Ala Glu Asp Val Gly Thr Ser Glu Arg Glu Leu Asn Ser  
 130 135 140

Val Val Leu Ala Cys Asn Ser Glu Met Val Leu Ile Pro Met Asn Glu  
 145 150 155 160

Pro Val Tyr Gly Xaa Lys Gly Arg Ala Arg  
 165 170

<210> 19  
 <211> 1165  
 <212> DNA  
 <213> Triticum aestivum

<220>  
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 <222> (567)  
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 ccgcttccac acgctcgcc tccaccacgt cgagttctgg tgcgcggacg ccgcctccgc 180  
 cgccggccgc ttgccttcg cgctcggcgc gccgctcgcc gccaggtcg acctctccac 240  
 ggggaactcc gtgcacgcct cccagctgct ccgctcgggc aacctcgcc tctctttcac 300  
 cgcgccctac gccaacggct gcgacgccgc caccgectcc ctgcccctct tctccgccga 360  
 cgccgcgcgc cggttctccg cggaccacgg gctcgcggtg cgctccatag cgctgcgcgt 420  
 cgcgagcgc gccgaggcct tccgcgccag cgtcgacggg ggccgcgcgc ccgccttcag 480  
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 ttgagcaacc ggggtgccgtg gactaanggc tgacacgnt tgacacgttg tccgnaagtc 660  
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 taacacggag gacgtgggca cggccgagag cgggctcaac tcgatggtgc tcgccaacaa 780  
 ctccggagggc gtgctgctgc cgctcaacga gccggtgcac ggcaccaagc gccggagcca 840  
 gatacagacg ttcttggaac accacggcgc ctccggcggtg cagcacatcg cgggtggccag 900  
 cagcgacgtg ctccaggacgc tcaggagat gcgtgcgcgc tccgccatgg gcggcttcga 960  
 ctctctgcca ccccgctgc cgaagtacta cgaaggcgtg cggcgcatcg ccgggggatgt 1020  
 gctctcggag gcgcaaatna aggaatgcaa gaactggggg tgctcntcca caaggaagaa 1080  
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 <211> 179  
 <212> PRT  
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 20 25 30  
 Ser Asp Arg Phe His Thr Leu Ala Phe His His Val Glu Phe Trp Cys  
 35 40 45  
 Ala Asp Ala Ala Ser Ala Ala Gly Arg Phe Ala Phe Ala Leu Gly Ala  
 50 55 60  
 Pro Leu Ala Ala Arg Ser Asp Leu Ser Thr Gly Asn Ser Val His Ala  
 65 70 75 80  
 Ser Gln Leu Leu Arg Ser Gly Asn Leu Ala Phe Leu Phe Thr Ala Pro  
 85 90 95

Tyr Ala Asn Gly Cys Asp Ala Ala Thr Ala Ser Leu Pro Ser Phe Ser  
 100 105 110  
 Ala Asp Ala Ala Arg Arg Phe Ser Ala Asp His Gly Leu Ala Val Arg  
 115 120 125  
 Ser Ile Ala Leu Arg Val Ala Asp Ala Ala Glu Ala Phe Arg Ala Ser  
 130 135 140  
 Val Asp Gly Gly Ala Arg Pro Ala Phe Ser Pro Val Asp Leu Gly Arg  
 145 150 155 160  
 Gly Phe Gly Phe Ala Glu Val Glu Leu Tyr Gly Asp Val Val Leu Arg  
 165 170 175

Phe Val Ser

<210> 21  
 <211> 1102  
 <212> DNA  
 <213> Zea mays

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 gccgtcgtca gcctgcgtcc gatggcctcg tcgacggctc aggccccgcg gacggcgccg 180  
 ccgggtctga aggagggcat cgcggggctg tacgacgagt cgtcggggct gtgggagaac 240  
 atctggggcg accacatgca ccacggcttc tacgactcga gcgaggccgc ctccatggcc 300  
 gatcaccgcc gcgcccagat ccgcctgctc gaggaggcgc tcgccttcgc cgggtgtccca 360  
 gcctcagatg atccagagaa gacaccaaaa acaatagtcg atgtcggatg tggcattggt 420  
 ggtagctcaa ggtacttggc gaagaaatac ggancgcagt gcactgggat cacgttgagc 480  
 cctgttcaag ccgagagagg aaatgctctc gctgcagcgc aggggttggt ggatcagggt 540  
 actctgcaag ttgctgatgc tctggagcaa ccgtttcctg acgggcagtt cgatctggtg 600  
 tgggtccatgg agagtggcga gcacatgccg gacaagagaa agtttggttag tgagctagca 660

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tactacctcc cggactgggtg ctcaccttca gactatgtga acattgccaa gtcactgtct 840
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ataaaatcag cgctaacatg gaagggcttc acctctctgc tgacgaccgg atggaagacg 960
atcagaggcg cgatgggtgat gccgctaata atccagggct acaagaaggg gctcatcaaa 1020
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<210> 22
<211> 352
<212> PRT
<213> Zea mays

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<223> Xaa = ANY AMINO ACID

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      20              25              30

Arg His Ser Arg Arg Leu Arg Arg Ala Val Val Ser Leu Arg Pro Met
      35              40              45

Ala Ser Ser Thr Ala Gln Ala Pro Ala Thr Ala Pro Pro Gly Leu Lys
      50              55              60

Glu Gly Ile Ala Gly Leu Tyr Asp Glu Ser Ser Gly Leu Trp Glu Asn
      65              70              75              80

Ile Trp Gly Asp His Met His His Gly Phe Tyr Asp Ser Ser Glu Ala
      85              90              95

Ala Ser Met Ala Asp His Arg Arg Ala Gln Ile Arg Met Ile Glu Glu
      100              105              110

Ala Leu Ala Phe Ala Gly Val Pro Ala Ser Asp Asp Pro Glu Lys Thr
      115              120              125

Pro Lys Thr Ile Val Asp Val Gly Cys Gly Ile Gly Gly Ser Ser Arg
      130              135              140

Tyr Leu Ala Lys Lys Tyr Gly Xaa Gln Cys Thr Gly Ile Thr Leu Ser
      145              150              155              160

Pro Val Gln Ala Glu Arg Gly Asn Ala Leu Ala Ala Ala Gln Gly Leu
      165              170              175

Ser Asp Gln Val Thr Leu Gln Val Ala Asp Ala Leu Glu Gln Pro Phe
      180              185              190

Pro Asp Gly Gln Phe Asp Leu Val Trp Ser Met Glu Ser Gly Glu His
      195              200              205

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Met	Pro	Asp	Lys	Arg	Lys	Phe	Val	Ser	Glu	Leu	Ala	Arg	Val	Ala	Ala
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Pro	Gly	Gly	Thr	Ile	Ile	Ile	Val	Thr	Trp	Cys	His	Arg	Asn	Leu	Asp
225					230					235					240
Pro	Ser	Glu	Thr	Ser	Leu	Lys	Pro	Asp	Glu	Leu	Ser	Leu	Leu	Arg	Arg
				245					250					255	
Ile	Cys	Asp	Ala	Tyr	Tyr	Leu	Pro	Asp	Trp	Cys	Ser	Pro	Ser	Asp	Tyr
			260					265					270		
Val	Asn	Ile	Ala	Lys	Ser	Leu	Ser	Leu	Glu	Asp	Ile	Lys	Thr	Ala	Asp
	275						280					285			
Trp	Ser	Glu	Asn	Val	Ala	Pro	Phe	Trp	Pro	Ala	Val	Ile	Lys	Ser	Ala
	290					295					300				
Leu	Thr	Trp	Lys	Gly	Phe	Thr	Ser	Leu	Leu	Thr	Thr	Gly	Trp	Lys	Thr
305					310					315					320
Ile	Arg	Gly	Ala	Met	Val	Met	Pro	Leu	Met	Ile	Gln	Gly	Tyr	Lys	Lys
			325						330					335	
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<211> 521

<212> DNA

<213> Oryza sativa

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<222> (269)

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<220>  
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<222> (514)  
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gatgagctga atctcctgaa aaggatatgc gatgcatatt atctcccaga ctggtgctct 180  
ccttctgatt atgtcaaaat tgccgagtca ctgtctcttg aggatataag gacagctgat 240  
tggtcaagag aacgtcgccc caatccggnc tgcngggttat taaatnaagc aattgacatg 300  
gnaagggtta actttctcct ggctaagaan tgggtgggaa gacgattaag aagggtggaat 360  
gggtgatgcc tccgatgat nnaaggntac aaagaaangg gtcaacaaat ttaacaanaa 420  
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<210> 24  
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 <212> PRT  
 <213> Oryza sativa  
  
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 Asp Leu Val Trp Ser Met Glu Ser Asp Glu His Met Pro Asp Lys Arg  
                   20                  25                  30  
 Gln Phe Val Ser Glu Leu Ala Arg Val Ala Ala Pro Gly Ala Arg Ile  
           35                  40                  45  
 Ile Ile Val Thr Trp Cys His Arg Asn Leu Glu Pro Ser Glu Glu Ser  
   50                  55                  60  
 Leu Lys Pro Asp Glu Leu Asn Leu Leu Lys Arg Ile Cys Asp Ala Tyr  
   65                  70                  75                  80  
 Tyr Leu Pro Asp Trp Cys Ser Pro Ser Asp Tyr Val Lys Ile Ala Glu  
                   85                  90                  95  
 Ser Leu Ser Leu Glu Asp Ile Arg Thr Ala Asp Trp Ser Glu Asn Val  
           100                  105                  110  
 Ala Pro Phe Trp Pro Ala Val Ile Lys Ser Ala Leu Thr Trp Lys Gly  
           115                  120                  125  
 Leu Thr Ser Leu Leu Arg Ser Gly Trp Glu Thr Val Arg Gly Ala Met  
   130                  135                  140  
 Val Met Pro Leu Val Ile Glu Gly Tyr Lys Lys Gly Leu Ile Lys Phe  
   145                  150                  155                  160  
 Pro Ile Ile Thr Cys Arg Lys Pro Glu Thr Thr Gln  
                   165                  170

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 <213> Oryza sativa  
  
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 gacgccggcg aggcgcctc catgtccgac caccgccgcg ccagatccg catgatcgag 360  
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<210> 26  
 <211> 128  
 <212> PRT  
 <213> Oryza sativa

<400> 26  
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Arg Cys Thr Ser Arg His Leu Cys Ala Ser Ala Ser Pro Arg Ala Gly  
20 25 30  
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35 40 45  
Lys Leu Ala Val Arg Ala Met Ala Pro Thr Leu Ser Ser Ser Ser Thr  
50 55 60  
Ala Ala Ala Ala Pro Pro Gly Leu Lys Glu Gly Ile Ala Gly Leu Tyr  
65 70 75 80  
Asp Glu Ser Ser Gly Val Trp Glu Ser Ile Trp Gly Glu His Met His  
85 90 95  
His Gly Phe Tyr Asp Ala Gly Glu Ala Ala Ser Met Ser Asp His Arg  
100 105 110  
Arg Ala Gln Ile Arg Met Ile Glu Glu Ser Leu Ala Phe Ala Ala Val  
115 120 125

<210> 27  
<211> 1189  
<212> DNA  
<213> Glycine max

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tcgggcatcg gcagcgagct cggagagagg ggagatagta ttggagcaga agccgaagaa 180  
ggatgacaag aagaagctgc agaagggaat cgcagagttt tacgacgagt cgtctggctt 240  
atgggagaac atttggggcg accacatgca ccatggcttt tatgactcgg attccactgt 300  
ttcgctttcg gatcatcgtg ctgctcagat ccgaatgac caagagtctc ttcgctttgc 360  
ctctgtttct gaggagcgta gtaaattggcc caagagtata gttgatgttg ggtgtggcat 420  
aggtggcagc tctagatacc tggccaagaa atttgagca accagtgtag gcatcactct 480  
gagtcctgtt caagctcaaa gagcaaatgc tcttgctgct gctcaaggat tggctgataa 540  
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agctcgggta gcagcaccag gtgccattat aataatagta acatgggtgcc acagggatct 720  
tggccctgac gaacaatcct tacatccatg ggagcaagat ctcttaaaga agatttgca 780  
tgcattattc ctccctgcct ggtgctcaac ttctgattat gttaagttgc tccaatccct 840  
gtcacttcag gacatcaagt cagaagattg gtctcgcttt gttgctccat tttggccagc 900  
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taagtttgcc atcattacat gtcgaaaacc tgaataaatg gagaggcagg attactttta 1080  
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<210> 28  
<211> 350  
<212> PRT  
<213> Glycine max

<400> 28  
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Pro	Arg	Ser	Trp	Ala	Pro	Ile	Arg	Ala	Ser	Ala	Ala	Ser	Ser	Glu	Arg		
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Gly	Glu	Ile	Val	Leu	Glu	Gln	Lys	Pro	Lys	Lys	Asp	Asp	Lys	Lys	Lys		
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Ser	Thr	Val	Ser	Leu	Ser	Asp	His	Arg	Ala	Ala	Gln	Ile	Arg	Met	Ile		
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		115					120					125					
Pro	Lys	Ser	Ile	Val	Asp	Val	Gly	Cys	Gly	Ile	Gly	Gly	Ser	Ser	Arg		
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	210					215					220						
Pro	Gly	Ala	Ile	Ile	Ile	Ile	Val	Thr	Trp	Cys	His	Arg	Asp	Leu	Gly		
	225				230					235					240		
Pro	Asp	Glu	Gln	Ser	Leu	His	Pro	Trp	Glu	Gln	Asp	Leu	Leu	Lys	Lys		
				245					250					255			
Ile	Cys	Asp	Ala	Tyr	Tyr	Leu	Pro	Ala	Trp	Cys	Ser	Thr	Ser	Asp	Tyr		
			260					265					270				
Val	Lys	Leu	Leu	Gln	Ser	Leu	Ser	Leu	Gln	Asp	Ile	Lys	Ser	Glu	Asp		
		275					280					285					
Trp	Ser	Arg	Phe	Val	Ala	Pro	Phe	Trp	Pro	Ala	Val	Ile	Arg	Ser	Ala		
	290					295					300						
Phe	Thr	Trp	Lys	Gly	Leu	Ser	Ser	Leu	Leu	Ser	Ser	Gly	Gln	Lys	Thr		
	305				310					315					320		
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<210> 29  
 <211> 1257  
 <212> DNA  
 <213> Triticum aestivum

<220>  
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 <222> (31)  
 <223> n = a, c, g, or t

<220>  
 <221> unsure  
 <222> (151)  
 <223> n = a, c, g, or t

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 aggccctcgc cttcgccgcc gtccccgacg atccgacaaa caaacccaaa acgattgttg 420  
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 gctctgggat cacattgagc ccagtgcagg ctgagagagg aaatgccctc gcggcagcgc 540  
 aggggttggt ggacaaggct tctttccaag ttgctgatgc tctggagcaa ccatttctctg 600  
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<210> 30  
 <211> 366  
 <212> PRT  
 <213> Triticum aestivum

<220>  
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 <223> Xaa = ANY AMINO ACID

<220>  
 <221> UNSURE  
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 <223> Xaa = ANY AMINO ACID

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 35 40 45  
 Pro Asp Gly Val Val Asp Asp Arg Gly Pro Gly Asp Ala Ala Pro Pro  
 50 55 60  
 Gly Leu Lys Glu Gly Ile Ala Gly Leu Tyr Asp Glu Ser Ser Gly Leu  
 65 70 75 80  
 Trp Glu Ser Ile Trp Gly Glu His Met His His Gly Phe Tyr Asp Ser  
 85 90 95  
 Gly Glu Ala Ala Ser Met Ser Asp His Arg Arg Ala Gln Ile Arg Met  
 100 105 110  
 Ile Glu Glu Ala Leu Ala Phe Ala Ala Val Pro Asp Asp Pro Thr Asn  
 115 120 125  
 Lys Pro Lys Thr Ile Val Asp Val Gly Cys Gly Ile Gly Gly Ser Ser  
 130 135 140  
 Arg Tyr Leu Ala Asn Lys Tyr Gly Ala Gln Cys Ser Gly Ile Thr Leu  
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 Ser Pro Val Gln Ala Glu Arg Gly Asn Ala Leu Ala Ala Ala Gln Gly  
 165 170 175  
 Leu Ser Asp Lys Ala Ser Phe Gln Val Ala Asp Ala Leu Glu Gln Pro  
 180 185 190  
 Phe Pro Asp Gly Gln Phe Asp Leu Val Trp Ser Met Glu Ser Gly Glu  
 195 200 205  
 His Met Pro Asn Lys Gln Lys Phe Val Ser Glu Leu Ala Arg Val Ala  
 210 215 220  
 Ala Pro Gly Ala Thr Ile Ile Ile Val Thr Trp Cys His Arg Asn Leu  
 225 230 235 240  
 Ala Pro Ser Glu Asp Ser Leu Lys Pro Asp Glu Leu Asn Leu Leu Lys  
 245 250 255  
 Lys Ile Cys Asp Ala Tyr Tyr Leu Pro Asp Trp Cys Ser Pro Ser Asp  
 260 265 270  
 Tyr Val Lys Ile Ala Glu Ser Leu Ser Leu Glu Asp Ile Lys Thr Ala  
 275 280 285  
 Asp Trp Ser Glu Asn Val Ala Pro Phe Trp Pro Ala Val Ile Gln Ser  
 290 295 300  
 Ala Leu Thr Trp Lys Gly Leu Thr Ser Leu Leu Arg Ser Gly Trp Lys  
 305 310 315 320  
 Thr Ile Lys Gly Ala Leu Val Met Pro Leu Met Ile Gln Gly Tyr Lys  
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<210> 31  
 <211> 1605  
 <212> DNA  
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 caagcagacg accacttccg ccaccgccgc ggacgggtcc aaagatgcgc atgcagaatt 180  
 caagctgggtg ggcttcaaga atttcgtcag gaccaacccc aagtccgacc acttctgcgt 240  
 ccaccgcttc caccatatag agttctgggtg cggcgacgcc accaacaccg ccaagcgctt 300  
 ctcttggggc ctcggtatgc ccctcgtcgc caaatcggat ctttccactg gaaactccgc 360  
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 gtcttttacc tcttcccatg gcctcgctgt tcgtgcgggtg gctattcagg tcgattcggc 540  
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 caagaacaga gctggagatg tgctgaggga tgagcagatt gaggagtgtg agaagttggg 1200  
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 <211> 445  
 <212> PRT  
 <213> Catalpa sp.

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 35 40 45  
 Glu Phe Trp Cys Gly Asp Ala Thr Asn Thr Ala Lys Arg Phe Ser Trp  
 50 55 60

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Phe	Thr	Ser	Pro	Tyr	Ser	Pro	Ser	Ile	Ser	Ala	Pro	Ser	Ser	Ala	Ala	
			100					105					110			
Ile	Pro	Ser	Phe	Ser	Phe	Ser	Thr	Tyr	Gln	Ser	Phe	Thr	Ser	Ser	His	
		115					120					125				
Gly	Leu	Ala	Val	Arg	Ala	Val	Ala	Ile	Gln	Val	Asp	Ser	Ala	Phe	Ser	
	130					135					140					
Ala	Tyr	Ser	Ala	Ser	Ile	Ser	Arg	Gly	Ala	Lys	Pro	Val	Ser	Ala	Pro	
145					150					155					160	
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			180					185					190			
Pro	Asp	Gly	Trp	Phe	Leu	Pro	Gly	Phe	Glu	Pro	Val	Asp	Asp	Gln	Met	
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Ser	Tyr	Lys	Glu	Leu	Asp	Tyr	Gly	Ile	Arg	Arg	Leu	Asp	His	Ala	Val	
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Leu	Ala	Leu	Val	Ser	Glu	Asp	Ile	Phe	Asn	Thr	Leu	Arg	Glu	Met	Arg	
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Lys	Arg	Ser	Gly	Val	Gly	Gly	Phe	Glu	Phe	Met	Pro	Ser	Pro	Pro	Leu	
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Thr	Tyr	Tyr	Lys	Asn	Leu	Lys	Asn	Arg	Ala	Gly	Asp	Val	Leu	Arg	Asp	
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Glu	Gln	Ile	Glu	Glu	Cys	Glu	Lys	Leu	Gly	Ile	Leu	Val	Asp	Arg	Asp	
		355					360					365				
Asp	Gln	Gly	Thr	Leu	Leu	Gln	Ile	Phe	Thr	Lys	Pro	Val	Gly	Asp	Arg	
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Pro Thr Leu Phe Ile Glu Ile Ile Gln Arg Ile Gly Cys Met Leu Lys  
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Asp Glu Gln Gly Lys Leu Tyr Gln Lys Ser Gly Cys Gly Gly Phe Gly  
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Lys Gly Asn Phe Ser Glu Leu Phe Lys Ser Ile Glu Glu Tyr Glu Lys  
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Met Leu Glu Ala Lys Gln Val Thr Glu Thr Ala Ser Ala  
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<210> 33

<211> 1106

<212> DNA

<213> Oryza sativa

<400> 33

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ccgccgagga cgtgggcacc gccgagagcg gcctcaactc ggtggtgctc gccaacaacg 180
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<210> 34

<211> 235

<212> PRT

<213> Oryza sativa

<400> 34

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Phe His Glu Phe Ala Glu Phe Thr Ala Glu Asp Val Gly Thr Ala Glu
          35          40          45

Ser Gly Leu Asn Ser Val Val Leu Ala Asn Asn Ala Glu Thr Val Leu
          50          55          60

Leu Pro Leu Asn Glu Pro Val His Gly Thr Lys Arg Arg Ser Gln Ile
65          70          75          80
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Gln Thr Tyr Leu Asp His His Gly Gly Pro Gly Val Gln His Ile Ala  
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 Ser Ala Met Gly Gly Phe Glu Phe Leu Ala Pro Pro Pro Pro Asn Tyr  
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 Tyr Asp Gly Val Arg Arg Arg Ala Gly Asp Val Leu Ser Glu Glu Gln  
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 Ile Asn Glu Cys Gln Glu Leu Gly Val Leu Val Asp Arg Asp Asp Gln  
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 Gly Val Leu Leu Gln Ile Phe Thr Lys Pro Val Gly Asp Arg Pro Thr  
                     165                    170                    175  
 Phe Phe Leu Glu Met Ile Gln Arg Ile Gly Cys Met Glu Lys Asp Glu  
                     180                    185                    190  
 Ser Gly Gln Glu Tyr Gln Lys Gly Gly Cys Gly Gly Phe Gly Lys Gly  
                     195                    200                    205  
 Asn Phe Ser Glu Leu Phe Lys Ser Ile Glu Glu Tyr Glu Lys Ser Leu  
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<210> 35

<211> 1550

<212> DNA

<213> Glycine max

<400> 35

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tccggagctg	gcgcggcgcg	tgagggtacct	gaaaggcttc	agcggattcc	acgagttcgc	780
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gaacaactcg	gagacgggtg	tgctgccgct	gaacgagccg	gtttacggaa	cgaagaggaa	900
gagccagatt	gagacgtatt	tggaacacaa	cgaaggtgct	ggtgtgcagc	accttgcgct	960
tggtactcac	gacatcttca	ccacactgag	agagatgaga	aagcgaagtt	tccttggtgg	1020
atttgagttc	atgccttctc	ctcctcccac	ctattacgcc	aacctccaca	accgtgccgc	1080
tgatgtgttg	accgttgacc	agattaagca	gtgtgaggag	cttgggattc	ttgttgacag	1140
agatgatcag	ggcactctgc	ttcagatttt	caccaagcct	gttggggaca	ggccaacgat	1200
attcatagag	ataattcaga	ggatcggggtg	catggtggag	gatgaggaag	ggaaggtgta	1260
ccagaagggt	gcatgtgggg	gttttgggaa	aggcaatttt	tctgagcttt	tcaaataccat	1320
tgaagaatat	gagaagactt	tggaagctaa	aagaaccgcg	taagcacatt	ggaagaacac	1380
aaatactcct	ttgttgaaat	gattaatgag	gaatcaatgt	ggcatagggt	gtttatactc	1440

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 cttttatgga tagtattttt ctattaaaaa aaaaaaaaaa aaaaaaaaaa 1550

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 <211> 449  
 <212> PRT  
 <213> Glycine max

<400> 36  
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 Ala Gln Ala Gln Pro Gly Phe Lys Leu Val Gly Phe Lys Asn Phe Val  
 20 25 30  
 Arg Thr Asn Pro Lys Ser Asp Arg Phe Gln Val Asn Arg Phe His His  
 35 40 45  
 Ile Glu Phe Trp Cys Thr Asp Ala Thr Asn Ala Ser Arg Arg Phe Ser  
 50 55 60  
 Trp Gly Leu Gly Met Pro Ile Val Ala Lys Ser Asp Leu Ser Thr Gly  
 65 70 75 80  
 Asn Gln Ile His Ala Ser Tyr Leu Leu Arg Ser Gly Asp Leu Ser Phe  
 85 90 95  
 Leu Phe Ser Ala Pro Tyr Ser Pro Ser Leu Ser Ala Gly Ser Ser Ala  
 100 105 110  
 Ala Ser Ser Ala Ser Ile Pro Ser Phe Asp Ala Ala Thr Cys Leu Ala  
 115 120 125  
 Phe Ala Ala Lys His Gly Phe Gly Val Arg Ala Ile Ala Leu Glu Val  
 130 135 140  
 Ala Asp Ala Glu Ala Ala Phe Ser Ala Ser Val Ala Lys Gly Ala Glu  
 145 150 155 160  
 Pro Ala Ser Pro Pro Val Leu Val Asp Asp Arg Thr Gly Phe Ala Glu  
 165 170 175  
 Val Arg Leu Tyr Gly Asp Val Val Leu Arg Tyr Val Ser Tyr Lys Asp  
 180 185 190  
 Ala Ala Pro Gln Ala Pro His Ala Asp Pro Ser Arg Trp Phe Leu Pro  
 195 200 205  
 Gly Phe Glu Ala Ala Ala Ser Ser Ser Ser Phe Pro Glu Leu Asp Tyr  
 210 215 220  
 Gly Ile Arg Arg Leu Asp His Ala Val Gly Asn Val Pro Glu Leu Ala  
 225 230 235 240  
 Pro Ala Val Arg Tyr Leu Lys Gly Phe Ser Gly Phe His Glu Phe Ala  
 245 250 255  
 Glu Phe Thr Ala Glu Asp Val Gly Thr Ser Glu Ser Gly Leu Asn Ser  
 260 265 270



Val	Val	Leu	Ala	Asn	Asn	Ser	Glu	Thr	Val	Leu	Leu	Pro	Leu	Asn	Glu	
		275					280					285				
Pro	Val	Tyr	Gly	Thr	Lys	Arg	Lys	Ser	Gln	Ile	Glu	Thr	Tyr	Leu	Glu	
		290				295					300					
His	Asn	Glu	Gly	Ala	Gly	Val	Gln	His	Leu	Ala	Leu	Val	Thr	His	Asp	
305					310					315					320	
Ile	Phe	Thr	Thr	Leu	Arg	Glu	Met	Arg	Lys	Arg	Ser	Phe	Leu	Gly	Gly	
				325					330					335		
Phe	Glu	Phe	Met	Pro	Ser	Pro	Pro	Pro	Thr	Tyr	Tyr	Ala	Asn	Leu	His	
			340					345					350			
Asn	Arg	Ala	Ala	Asp	Val	Leu	Thr	Val	Asp	Gln	Ile	Lys	Gln	Cys	Glu	
		355					360					365				
Glu	Leu	Gly	Ile	Leu	Val	Asp	Arg	Asp	Asp	Gln	Gly	Thr	Leu	Leu	Gln	
	370					375					380					
Ile	Phe	Thr	Lys	Pro	Val	Gly	Asp	Arg	Pro	Thr	Ile	Phe	Ile	Glu	Ile	
385				390					395						400	
Ile	Gln	Arg	Ile	Gly	Cys	Met	Val	Glu	Asp	Glu	Glu	Gly	Lys	Val	Tyr	
			405					410						415		
Gln	Lys	Gly	Ala	Cys	Gly	Gly	Phe	Gly	Lys	Gly	Asn	Phe	Ser	Glu	Leu	
		420					425					430				
Phe	Lys	Ser	Ile	Glu	Glu	Tyr	Glu	Lys	Thr	Leu	Glu	Ala	Lys	Arg	Thr	
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Ala

<210> 37

<211> 1614

<212> DNA

<213> Triticum aestivum

<400> 37

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gcagcgaccg	cttcacacag	ctcgccttcc	accacgtcga	gttctggtgc	gcggacgccg	180
cctccgccgc	cgccgcgttc	gccttcgcgc	tcggcgccgc	gctcgccgcc	aggtccgacc	240
tctccacggg	gaactccgtg	cacgcctccc	agctgctccg	ctcgggcaac	ctcgccttcc	300
tcttcacggc	cccctacgcc	aacggctgcy	acgccgccac	cgctccctg	ccctccttct	360
ccgccgacgc	cgcgcgccag	ttctccgcgg	accacggcct	cgcggtgcgc	tccatagcgc	420
tgcgcgtcgc	ggacgctgcc	gaggccttcc	gcgccagcgt	cgacgggggc	gcgcgcccgc	480
ccttcagccc	tgtggacctc	ggccgcggct	tcggcttcgc	ggaggtcgag	ctctacggcg	540
acgtcgtgct	ccgcttcgtc	agccaccccg	acggcaggga	cgtgcccttc	ttgccggggt	600
tcgagggcgt	gagcaaccca	gacgccgtgg	actacggcct	gacgcggttc	gaccacgtcg	660
tcggcaacgt	ccgggagctt	gccccgcgcg	cgccctacgt	cgccgggttc	acgggggttc	720
acgagttcgc	cgagttcacg	acggaggacg	tgggcacggc	cgagagcggg	ctcaactcga	780
tggtgctcgc	caacaactcg	gagggcgctg	tgctgccgct	caacgagccg	gtgcacggca	840
ccaagcgccg	gagccagata	cagacgttcc	tggaaacacca	cggcggtctg	ggcgtgcagc	900
acatcgccgt	ggccagcagc	gacgtgctca	ggacgctcag	ggagatgcgt	gcgcgctccg	960
ccatgggcgg	cttcgacttc	ctgccacccc	cgctgccgaa	gtactacgaa	ggcgtgcggc	1020
gcacgcgccg	ggatgtgctc	tcggaggcgc	agatcaagga	atgccaggag	ctggggggtgc	1080

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tcgtcgacag ggacgaccaa ggggtgttgc tacaaatctt caccaagcca gtaggggaca 1140
ggccgacgtt gttcctggag atgatccaga ggatcgggtg catggagaag gacgagagag 1200
gggaagagta ccagaagggg ggctgcggcg ggctcggcaa aggcaacttc tccgagctgt 1260
tcaagtccat tgaagattac gagaagtccc ttgaagccaa gcaatctgct gcagttcagg 1320
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ggctcggctc acacatgaac aaaatgtact gttggcattg ttgtataatc ttgcttgcaa 1560
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<210> 38

<211> 433

<212> PRT

<213> Triticum aestivum

<400> 38

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Met Pro Pro Thr Pro Thr Thr Pro Ala Ala Thr Gly Ala Ala Ala Val
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Thr Pro Glu His Ala Arg Pro Arg Arg Met Val Arg Phe Asn Pro Arg
      20              25              30

Ser Asp Arg Phe His Thr Leu Ala Phe His His Val Glu Phe Trp Cys
      35              40              45

Ala Asp Ala Ala Ser Ala Ala Gly Arg Phe Ala Phe Ala Leu Gly Ala
      50              55              60

Pro Leu Ala Ala Arg Ser Asp Leu Ser Thr Gly Asn Ser Val His Ala
      65              70              75              80

Ser Gln Leu Leu Arg Ser Gly Asn Leu Ala Phe Leu Phe Thr Ala Pro
      85              90              95

Tyr Ala Asn Gly Cys Asp Ala Ala Thr Ala Ser Leu Pro Ser Phe Ser
      100              105              110

Ala Asp Ala Ala Arg Gln Phe Ser Ala Asp His Gly Leu Ala Val Arg
      115              120              125

Ser Ile Ala Leu Arg Val Ala Asp Ala Ala Glu Ala Phe Arg Ala Ser
      130              135              140

Val Asp Gly Gly Ala Arg Pro Ala Phe Ser Pro Val Asp Leu Gly Arg
      145              150              155              160

Gly Phe Gly Phe Ala Glu Val Glu Leu Tyr Gly Asp Val Val Leu Arg
      165              170              175

Phe Val Ser His Pro Asp Gly Arg Asp Val Pro Phe Leu Pro Gly Phe
      180              185              190

Glu Gly Val Ser Asn Pro Asp Ala Val Asp Tyr Gly Leu Thr Arg Phe
      195              200              205

Asp His Val Val Gly Asn Val Pro Glu Leu Ala Pro Ala Ala Ala Tyr
      210              215              220

Val Ala Gly Phe Thr Gly Phe His Glu Phe Ala Glu Phe Thr Thr Glu
      225              230              235              240

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Ala Val Ala Ala Ala Ala Thr Ser Thr Glu Ala Leu Arg Lys Gly Ile  
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 Ala Glu Phe Tyr Asn Glu Thr Ser Gly Leu Trp Glu Glu Ile Trp Gly  
 65 70 75 80  
 Asp His Met His His Gly Phe Tyr Asp Pro Asp Ser Ser Val Gln Leu  
 85 90 95  
 Ser Asp Ser Gly His Lys Glu Ala Gln Ile Arg Met Ile Glu Glu Ser  
 100 105 110  
 Leu Arg Phe Ala Gly Val Thr Asp Glu Glu Glu Glu Lys Lys Ile Lys  
 115 120 125  
 Lys Val Val Asp Val Gly Cys Gly Ile Gly Gly Ser Ser Arg Tyr Leu  
 130 135 140  
 Ala Ser Lys Phe Gly Ala Glu Cys Ile Gly Ile Thr Leu Ser Pro Val  
 145 150 155 160  
 Gln Ala Lys Arg Ala Asn Asp Leu Ala Ala Ala Gln Ser Leu Ser His  
 165 170 175  
 Lys Ala Ser Phe Gln Val Ala Asp Ala Leu Asp Gln Pro Phe Glu Asp  
 180 185 190  
 Gly Lys Phe Asp Leu Val Trp Ser Met Glu Ser Gly Glu His Met Pro  
 195 200 205  
 Asp Lys Ala Lys Phe Val Lys Glu Leu Val Arg Val Ala Ala Pro Gly  
 210 215 220  
 Gly Arg Ile Ile Ile Val Thr Trp Cys His Arg Asn Leu Ser Ala Gly  
 225 230 235 240  
 Glu Glu Ala Leu Gln Pro Trp Glu Gln Asn Ile Leu Asp Lys Ile Cys  
 245 250 255  
 Lys Thr Phe Tyr Leu Pro Ala Trp Cys Ser Thr Asp Asp Tyr Val Asn  
 260 265 270  
 Leu Leu Gln Ser His Ser Leu Gln Asp Ile Lys Cys Ala Asp Trp Ser  
 275 280 285  
 Glu Asn Val Ala Pro Phe Trp Pro Ala Val Ile Arg Thr Ala Leu Thr  
 290 295 300  
 Trp Lys Gly Leu Val Ser Leu Leu Arg Ser Gly Met Lys Ser Ile Lys  
 305 310 315 320  
 Gly Ala Leu Thr Met Pro Leu Met Ile Glu Gly Tyr Lys Lys Gly Val  
 325 330 335  
 Ile Lys Phe Gly Ile Ile Thr Cys Gln Lys Pro Leu  
 340 345

<210> 41

<211> 434

<212> PRT

<213> Hordeum vulgare

<400> 41

Met	Pro	Pro	Thr	Pro	Thr	Thr	Pro	Ala	Ala	Thr	Gly	Ala	Ala	Ala	Ala
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Val	Thr	Pro	Glu	His	Ala	Arg	Pro	His	Arg	Met	Val	Arg	Phe	Asn	Pro
			20					25					30		
Arg	Ser	Asp	Arg	Phe	His	Thr	Leu	Ser	Phe	His	His	Val	Glu	Phe	Trp
		35					40					45			
Cys	Ala	Asp	Ala	Ala	Ser	Ala	Ala	Gly	Arg	Phe	Ala	Phe	Ala	Leu	Gly
	50					55					60				
Ala	Pro	Leu	Ala	Ala	Arg	Ser	Asp	Leu	Ser	Thr	Gly	Asn	Ser	Ala	His
65					70					75					80
Ala	Ser	Gln	Leu	Leu	Arg	Ser	Gly	Ser	Leu	Ala	Phe	Leu	Phe	Thr	Ala
			85						90					95	
Pro	Tyr	Ala	Asn	Gly	Cys	Asp	Ala	Ala	Thr	Ala	Ser	Leu	Pro	Ser	Phe
			100					105					110		
Ser	Ala	Asp	Ala	Ala	Arg	Arg	Phe	Ser	Ala	Asp	His	Gly	Ile	Ala	Val
		115					120					125			
Arg	Ser	Val	Ala	Leu	Arg	Val	Ala	Asp	Ala	Ala	Glu	Ala	Phe	Arg	Ala
	130					135					140				
Ser	Arg	Arg	Arg	Gly	Ala	Arg	Pro	Ala	Phe	Ala	Pro	Val	Asp	Leu	Gly
145					150				155						160
Arg	Gly	Phe	Ala	Phe	Ala	Glu	Val	Glu	Leu	Tyr	Gly	Asp	Val	Val	Leu
			165					170						175	
Arg	Phe	Val	Ser	His	Pro	Asp	Gly	Thr	Asp	Val	Pro	Phe	Leu	Pro	Gly
			180					185					190		
Phe	Glu	Gly	Val	Thr	Asn	Pro	Asp	Ala	Val	Asp	Tyr	Gly	Leu	Thr	Arg
		195					200					205			
Phe	Asp	His	Val	Val	Gly	Asn	Val	Pro	Glu	Leu	Ala	Pro	Ala	Ala	Ala
	210					215					220				
Tyr	Ile	Ala	Gly	Phe	Thr	Gly	Phe	His	Glu	Phe	Ala	Glu	Phe	Thr	Ala
225					230					235					240
Glu	Asp	Val	Gly	Thr	Thr	Glu	Ser	Gly	Leu	Asn	Ser	Val	Val	Leu	Ala
				245					250					255	
Asn	Asn	Ser	Glu	Gly	Val	Leu	Leu	Pro	Leu	Asn	Glu	Pro	Val	His	Gly
			260					265					270		
Thr	Lys	Arg	Arg	Ser	Gln	Ile	Gln	Thr	Phe	Leu	Glu	His	His	Gly	Gly
		275					280					285			
Pro	Gly	Val	Gln	His	Ile	Ala	Val	Ala	Ser	Ser	Asp	Val	Leu	Arg	Thr
	290					295					300				

Leu Arg Lys Met Arg Ala Arg Ser Ala Met Gly Gly Phe Asp Phe Leu  
 305 310 315 320  
 Pro Pro Pro Leu Pro Lys Tyr Tyr Glu Gly Val Arg Arg Leu Ala Gly  
 325 330 335  
 Asp Val Leu Ser Glu Ala Gln Ile Lys Glu Cys Gln Glu Leu Gly Val  
 340 345 350  
 Leu Val Asp Arg Asp Asp Gln Gly Val Leu Leu Gln Ile Phe Thr Lys  
 355 360 365  
 Pro Val Gly Asp Arg Pro Thr Leu Phe Leu Glu Met Ile Gln Arg Ile  
 370 375 380  
 Gly Cys Met Glu Lys Asp Glu Arg Gly Glu Glu Tyr Gln Lys Gly Gly  
 385 390 395 400  
 Cys Gly Gly Phe Gly Lys Gly Asn Phe Ser Glu Leu Phe Lys Ser Ile  
 405 410 415  
 Glu Asp Tyr Glu Lys Ser Leu Glu Ala Lys Gln Ser Ala Ala Val Gln  
 420 425 430

Gly Ser

<210> 42  
 <211> 442  
 <212> PRT  
 <213> Daucus carota

<400> 42  
 Met Gly Lys Lys Gln Ser Glu Ala Glu Ile Leu Ser Ser Asn Ser Ser  
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 Asn Thr Ser Pro Ala Thr Phe Lys Leu Val Gly Phe Asn Asn Phe Val  
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 Arg Ala Asn Pro Lys Ser Asp His Phe Ala Val Lys Arg Phe His His  
 35 40 45  
 Ile Glu Phe Trp Cys Gly Asp Ala Thr Asn Thr Ser Arg Arg Phe Ser  
 50 55 60  
 Trp Gly Leu Gly Met Pro Leu Val Ala Lys Ser Asp Leu Ser Thr Gly  
 65 70 75 80  
 Asn Ser Val His Ala Ser Tyr Leu Val Arg Ser Ala Asn Leu Ser Phe  
 85 90 95  
 Val Phe Thr Ala Pro Tyr Ser Pro Ser Thr Thr Thr Ser Ser Gly Ser  
 100 105 110  
 Ala Ala Ile Pro Ser Phe Ser Ala Ser Gly Phe His Ser Phe Ala Ala  
 115 120 125  
 Lys His Gly Leu Ala Val Arg Ala Ile Ala Leu Glu Val Ala Asp Val  
 130 135 140

Ala Ala Ala Phe Glu Ala Ser Val Ala Arg Gly Ala Arg Pro Ala Ser  
 145 150 155 160  
 Ala Pro Val Glu Leu Asp Asp Gln Ala Trp Leu Ala Glu Val Glu Leu  
 165 170 175  
 Tyr Gly Asp Val Val Leu Arg Phe Val Ser Phe Gly Arg Glu Glu Gly  
 180 185 190  
 Leu Phe Leu Pro Gly Phe Glu Ala Val Glu Gly Thr Ala Ser Phe Pro  
 195 200 205  
 Asp Leu Asp Tyr Gly Ile Arg Arg Leu Asp His Ala Val Gly Asn Val  
 210 215 220  
 Thr Glu Leu Gly Pro Val Val Glu Tyr Ile Lys Gly Phe Thr Gly Phe  
 225 230 235 240  
 His Glu Phe Ala Glu Phe Thr Ala Glu Asp Val Gly Thr Leu Glu Ser  
 245 250 255  
 Gly Leu Asn Ser Val Val Leu Ala Asn Asn Glu Glu Met Val Leu Leu  
 260 265 270  
 Pro Leu Asn Glu Pro Val Tyr Gly Thr Lys Arg Lys Ser Gln Ile Gln  
 275 280 285  
 Thr Tyr Leu Glu His Asn Glu Gly Ala Gly Val Gln His Leu Ala Leu  
 290 295 300  
 Val Ser Glu Asp Ile Phe Arg Thr Leu Arg Glu Met Arg Lys Arg Ser  
 305 310 315 320  
 Cys Leu Gly Gly Phe Glu Phe Met Pro Ser Pro Pro Pro Thr Tyr Tyr  
 325 330 335  
 Lys Asn Leu Lys Asn Arg Val Gly Asp Val Leu Ser Asp Glu Gln Ile  
 340 345 350  
 Lys Glu Cys Glu Asp Leu Gly Ile Leu Val Asp Arg Asp Asp Gln Gly  
 355 360 365  
 Thr Leu Leu Gln Ile Phe Thr Lys Pro Val Gly Asp Arg Pro Thr Leu  
 370 375 380  
 Phe Ile Glu Ile Ile Gln Arg Val Gly Cys Met Leu Lys Asp Asp Ala  
 385 390 395 400  
 Gly Gln Met Tyr Gln Lys Gly Gly Cys Gly Gly Phe Gly Lys Gly Asn  
 405 410 415  
 Phe Ser Glu Leu Phe Lys Ser Ile Glu Glu Tyr Glu Lys Thr Leu Glu  
 420 425 430  
 Ala Lys Gln Ile Thr Gly Ser Ala Ala Ala  
 435 440

<210> 43

<211> 445



<212> PRT

<213> Arabidopsis thaliana

<400> 43

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Gly	Ala	Ala	Ser	Ser	Pro	Gly	Phe	Lys	Leu	Val	Gly	Phe	Ser	Lys	Phe
			20					25					30		
Val	Arg	Lys	Asn	Pro	Lys	Ser	Asp	Lys	Phe	Lys	Val	Lys	Arg	Phe	His
		35					40					45			
His	Ile	Glu	Phe	Trp	Cys	Gly	Asp	Ala	Thr	Asn	Val	Ala	Arg	Arg	Phe
	50					55					60				
Ser	Trp	Gly	Leu	Gly	Met	Arg	Phe	Ser	Ala	Lys	Ser	Asp	Leu	Ser	Thr
65					70					75					80
Gly	Asn	Met	Val	His	Ala	Ser	Tyr	Leu	Leu	Thr	Ser	Gly	Asp	Leu	Arg
				85					90					95	
Phe	Leu	Phe	Thr	Ala	Pro	Tyr	Ser	Pro	Ser	Leu	Ser	Ala	Gly	Glu	Ile
			100					105					110		
Lys	Pro	Thr	Thr	Thr	Ala	Ser	Ile	Pro	Ser	Phe	Asp	His	Gly	Ser	Cys
		115					120					125			
Arg	Ser	Phe	Phe	Ser	Ser	His	Gly	Leu	Gly	Val	Arg	Ala	Val	Ala	Ile
	130					135					140				
Glu	Val	Glu	Asp	Ala	Glu	Ser	Ala	Phe	Ser	Ile	Ser	Val	Ala	Asn	Gly
145					150					155					160
Ala	Ile	Pro	Ser	Ser	Pro	Pro	Ile	Val	Leu	Asn	Glu	Ala	Val	Thr	Ile
				165					170					175	
Ala	Glu	Val	Lys	Leu	Tyr	Gly	Asp	Val	Val	Leu	Arg	Tyr	Val	Ser	Tyr
			180					185					190		
Lys	Ala	Glu	Asp	Thr	Glu	Lys	Ser	Glu	Phe	Leu	Pro	Gly	Phe	Glu	Arg
		195					200					205			
Val	Glu	Asp	Ala	Ser	Ser	Phe	Pro	Leu	Asp	Tyr	Gly	Ile	Arg	Arg	Leu
	210					215					220				
Asp	His	Ala	Val	Gly	Asn	Val	Pro	Glu	Leu	Gly	Pro	Ala	Leu	Thr	Tyr
225					230					235					240
Val	Ala	Gly	Phe	Thr	Gly	Phe	His	Gln	Phe	Ala	Glu	Phe	Thr	Ala	Asp
				245					250					255	
Asp	Val	Gly	Thr	Ala	Glu	Ser	Gly	Leu	Asn	Ser	Ala	Val	Leu	Ala	Ser
			260					265					270		
Asn	Asp	Glu	Met	Val	Leu	Leu	Pro	Ile	Asn	Glu	Pro	Val	His	Gly	Thr
		275					280					285			
Lys	Arg	Lys	Ser	Gln	Ile	Gln	Thr	Tyr	Leu	Glu	His	Asn	Glu	Gly	Ala
	290					295						300			

Gly	Leu	Gln	His	Leu	Ala	Leu	Met	Ser	Glu	Asp	Ile	Phe	Arg	Thr	Leu	305	310	315	320
Arg	Glu	Met	Arg	Lys	Arg	Ser	Ser	Ile	Gly	Gly	Phe	Asp	Phe	Met	Pro	325	330	335	
Ser	Pro	Pro	Pro	Thr	Tyr	Tyr	Gln	Asn	Leu	Lys	Lys	Arg	Val	Gly	Asp	340	345	350	
Val	Leu	Ser	Asp	Asp	Gln	Ile	Lys	Glu	Cys	Glu	Glu	Leu	Gly	Ile	Leu	355	360	365	
Val	Asp	Arg	Asp	Asp	Gln	Gly	Thr	Leu	Leu	Gln	Ile	Phe	Thr	Lys	Pro	370	375	380	
Leu	Gly	Asp	Arg	Pro	Thr	Ile	Phe	Ile	Glu	Ile	Ile	Gln	Arg	Val	Gly	385	390	395	400
Cys	Met	Met	Lys	Asp	Glu	Glu	Gly	Lys	Ala	Tyr	Gln	Ser	Gly	Gly	Cys	405	410	415	
Gly	Gly	Phe	Gly	Lys	Gly	Asn	Phe	Ser	Glu	Leu	Phe	Lys	Ser	Ile	Glu	420	425	430	
Glu	Tyr	Glu	Lys	Thr	Leu	Glu	Ala	Lys	Gln	Leu	Val	Gly				435	440	445	